

The Islamia university Bahawalpur.

Department of chemistry.

Assignment topic:

Preparation of Molar , Normal and diluted solutions.

Submitted to:

Dr.Aziz-ur-Rehman

Submitted by:

Farzana sahiba

Roll no:

369

Session :

2017-2019

M.phil 2nd semester Analytical chemistry.

Molar solutions.

$$\text{Molarity} = M = \frac{\text{no. of moles}}{V(L)}$$

Or

$$\text{Molarity} = M = \frac{\text{given mass(g)}}{\text{mol.mass}} \times \frac{1}{V(L)}$$

Numericals:

Q :1. How many number of moles will participate to prepare the 0.5M NaOH in 25ml water?

Solution:

Given data: $M = 0.5M$, $V = 25ml$

We know that: $\text{Molarity} = M = \frac{\text{no. of moles}}{V(L)}$

So, $\text{no. of moles} = M \times V$
 $= 0.5 \times 0.025 = 0.0125 \text{ moles.}$

0.0125 moles will participate to prepare the 0.5M solution of NaOH in 25ml water.

Q:2. How many solute is required to prepare the 300ml of 0.8M CaCl₂?

Solution:

Given data: $M = 0.8M$, $V = 300ml = 0.3L$

We know that: $\text{Molarity} = M = \frac{\text{weight(g)}}{\text{mol.mass}} \times \frac{1}{V(L)}$

$$0.8 = \frac{\text{weight(g)}}{111} \times \frac{1}{0.3}$$

$$w = 0.8 \times 111 \times 0.3 / 1 = 26.64g$$

So 26.64g solute is required to prepare 0.8M CaCl₂ in 300ml water..

Q:3. If 20g of MgCl_2 dissolved to prepare 250ml solution .calculate its Molarity?

Solution:

Given data: weight=20g , V=250ml=0.25L

We know that: $\text{Molarity} = M = \frac{\text{given mass}}{\text{mol.mass}} \times \frac{1}{V(L)}$

$$M = \frac{20}{95} \times \frac{1}{0.25} = 0.84M$$

.....

Normal solutions:

Gram equivalent weight =GEW= mol.wt/no.of replaceable ion

So,

$$\text{Normality} = N = \frac{\text{given mass(g)}}{\text{GEW}} \times \frac{1}{V(L)}$$

Numericals :

Q :1. How will you prepare the 2N solution of H_3PO_4 in 5mL of water?

Solution:

Given data: normality=2N , V=5mL=0.005L

GEW= mol.wt/no.of replaceable ions

$$= 98/3=32.7g$$

$$\text{Normality} = N = \frac{\text{given mass(g)}}{\text{GEW}} \times \frac{1}{V(L)}$$

$$2 = \frac{\text{given mass}}{32.7} \times \frac{1}{0.005}$$

$$w = 2 \times 32.7 \times 0.005 = 0.327g$$

By dissolving 0.327g of phosphoric acid in 5ml of water one can prepare the 2N solution of phosphoric acid.

Q :2. Prepare 0.5N of MgSO_4 by dissolving 23.4g .

Solutions:

Given data: Normality = 0.5N , weight (g)=23.4g

Mol.wt= 120g GEW=120/2=60

We know that: Normality =N= $\frac{\text{given mass(g)}}{\text{GEW}} \times \frac{1}{V(\text{L})}$

$$0.5 = \frac{23.4}{60} \times \frac{1}{V}$$

$$V = \frac{23.4}{0.5 \times 60} = 0.78\text{L}$$

We can prepare the 0.5N MgSO_4 by dissolving 23.4g magnesium sulfate in 0.78L of water.

Q: 3. If sulphuric acid reacts with the NaOH to produce the 2 moles of water . calculate the normality of H_2SO_4 solution in 350ml solution containing 6.35g of H_2SO_4 ?

Solution: $2 \text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$

Given data: weight=6.35g GEW=98/2=49g

V=350ml=0.35L

We know that : Normality =N= $\frac{\text{given mass(g)}}{\text{GEW}} \times \frac{1}{V(\text{L})}$

$$N = \frac{6.35}{49} \times \frac{1}{0.35} = 0.37 \text{ N}$$

Dilution calculations:

Stock solution = required solution

$$M_1V_1 = M_2V_2$$

M_1 = Molarity of stock solution

V_1 = Volume of stock solution

M_2 =Molarity of required solution

V_2 = volume of required solution

Q:1. Calculate the volume of 2.5M of KOH .if you are provided with 100 ml of 10M.

Solution:

Given data: $M_1 = 10M$ $M_2 = 2.5 M$

$V_1 = 100ml$

We know that: $M_1V_1 = M_2V_2$

$$10 \times 100 = 2.5 \times V_2$$

$$V_2 = 10 \times 100 / 2.5 = 400ml$$

Q:2 . calculate the molarity of 250ml NaCl solution from the solution having concentration 0.5M in 50 ml of water.

Solution:

Given data: $M_2 = 0.5M$, $V_2 = 50ml$

$M_1 = 250ml$

We know that: $M_1V_1 = M_2V_2$

$$M_1 \times 250 = 0.5 \times 50ml$$

$$M_1 = 0.5 \times 50 / 250 = 0.1M$$

Q: 3. How will you prepare 500ml of 6M solution from the stock solution of 20M.

Solution:

Given data: $M_2 = 6M$, $V_2 = 500ml$

$M_1 = 20M$

We know that: $M_1V_1 = M_2V_2$

$$20 \times V_1 = 6 \times 500$$

$$V_1 = 6 \times 500 / 20 = 150ml.$$